

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 38

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOSEPH HUMMEL

Appeal No. 1997-0144
Application No. 08/424,223

ON BRIEF

MAILED

OCT 27 2000

PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Before CALVERT, FRANKFORT, and JENNIFER D. BAHR, Administrative Patent Judges.

FRANKFORT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 through 3, 5, 6, 11, 12, 15 through 18, 25, 26, 35 and 36. Claims 4, 7 through 10, 13, 14, 19 through 24 and 27 through 34, all of the other claims remaining in this application, stand withdrawn from consideration under 37 CFR § 1.142(b) as being directed to non-elected species.

Appeal No. 1997-0144
Application No. 08/424,223

Appellant's invention relates to a cut-resistant yarn suitable for machine knitting (e.g., Fig. 1 and claims 1, 17 and 25) and to such a cut-resistant yarn knitted to form an article of protective apparel, such as a cut-resistant protective glove (e.g., Fig. 7 and claims 35 and 36). Independent claims 1, 17 and 25 are representative of the subject matter on appeal and a copy of those claims, as reproduced from the Appendix to appellant's brief, is attached to this decision.

The prior art references relied upon by the examiner in rejecting the appealed claims are:

Bettcher	4,470,251	Sep. 11, 1984
Robins et al. (Robins)	4,912,781	Apr. 3, 1990

Claims 1 through 3, 5, 6, 11, 12, 15 through 18, 25, 26, 35 and 36 stand rejected under 35 U.S.C. § 103 as being unpatentable over Bettcher in view of Robins.

Rather than attempt to reiterate the examiner's full commentary with regard to the above-noted rejection and the conflicting viewpoints advanced by the examiner and appellant regarding the rejection, we make reference to the examiner's

Appeal No. 1997-0144
Application No. 08/424,223

answer (Paper No. 26, mailed July 11, 1996) for the reasoning in support of the rejection, and to appellant's substitute brief (Paper No. 33, filed December 21, 1998) and reply brief (Paper No. 28, filed September 5, 1996) for the arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by appellant and the examiner. As a consequence of our review, we have made the determination which follows.

Like the examiner, we note that Bettcher discloses a high strength, cut-resistant, knittable yarn (e.g., Fig. 1) comprising a core (10), a first wrapping (12) about the core and a second wrapping (14) about the first wrapping. The core (10) is preferably comprised of at least one strand (e.g., 16) of small diameter flexible wire, such as stainless steel wire, preferably annealed, and a parallel relatively non-stretchable, high strength multi-filament synthetic fiber (20), such as a high strength aromatic polyamide fiber, for example, Kevlar. Bettcher

further discloses that the first or inner wrapping (12) is preferably a high strength multi-filament aramid fiber (e.g., Kevlar), while the second or outer wrapping (14) is one having low friction, light weight, a silk-like hand, that is fast drying, resistant to light and low in cost, preferably, for example, nylon or a polyester (e.g., Dacron). In column 2, lines 56-62, Bettcher indicates that

[t]he core structure is designed to provide cut resistance, knittability, flexibility and add life to the yarn; and the windings retain the core and create body. The Kevlar wrapping increases the cut resistance, and the outer wrapping of nylon which gives the yarn an oily feel enhances the knittability of the yarn and overcomes the abrasive effect of the Kevlar wrapping.

In further describing the stainless steel wires (16, 18), Bettcher notes that they each have a tensile strength of about 125,000 lb./sq. in., while the synthetic fiber (20) of the core is relatively nonstretchable and of high strength, preferably having a tensile strength of about 400,000 lb./sq. in. or higher (col. 3, lines 1-9). The first wrapping (12), also formed of Kevlar, is described as being of high strength and as preferably being of about four hundred denier. It is noted that an outer wrapping (14) of 200 to 630 denier can be used with satisfactory results. At column 4, line 20, et seq., Bettcher expressly notes that

[t]he use of a high strength fiber strand, preferably one having a tensile strength of not less than four hundred thousand pounds per square inch, such as, high strength Kevlar, for example, Kevlar 29 aramid, preferably of the multifilament type in the core is very advantageous. Multifilament is more linear than spun and slides and/or flows better with the other parts of the core during fabrication and subsequent use of an article of apparel produced therewith. The high strength multifilament core strand which [sic] relatively unstretchable takes a great deal if not the major part of the tensile load to which the yarn is subjected during knitting. It also appears to increase the flexibility of the core part of the yarn over an all metal core and in turn makes the yarn more easily knit, i.e., imparts to the yarn greater knittability. The high strength synthetic wrapping 12 increases the cut resistance, etc. of the yarn but produces a hard rough, somewhat abrasive surface formed of hills and valleys lengthwise of the yarn. It does, however provide a desirable rigid backup surface for the outer winding 14. The top or outer wrapping which is preferably a white Nylon, a stretchable synthetic fiber, tends to fill out the valleys of the wrapping immediately therebeneath and produce a yarn having a good appearance and a relatively smoother non-abrasive surface. Apparel produced with yarn of the present invention has a relatively soft non-abrasive outer surface and maximum comfort.

The Robins patent, like Bettcher, discloses a composite yarn construction particularly adapted for use in cut-resistant body protective apparel. The composite yarn in Robins comprises (e.g., Fig. 2) a high strength core yarn (11) covered or overlaid with a knitted, cut and abrasion resistant strand (12) of stainless steel or a high strength multifilament yarn (col. 3, lines 23-27). The composite yarn may comprise a high strength

Appeal No. 1997-0144
Application No. 08/424,223

synthetic yarn as the core yarn overlaid with knitted stainless steel, a core yarn of nylon overlaid with knitted stainless steel, or may comprise a core of stainless steel filament overlaid with a knitted high strength synthetic multi-filament yarn (col. 2, lines 12-19). At column 3, lines 27-34, Robins notes that

[t]he preferable embodiment thus far developed uses a non-metallic yarn as the core yarn 11, for example, an 840 denier nylon multifilament yarn, with a .0045 inch stainless steel strand as the knitted cover yarn 12 which is applied over the core yarn 11. However, other embodiments of core yarn 11 could comprise any type of high strength synthetic fiber material.

In describing the embodiment seen in Figure 4, Robins again emphasizes (col. 3, lines 35-46) that the composite yarn utilizes a single multifilament core yarn (21), preferably a high strength multifilament, onto which is knitted a stainless steel covering yarn (22). Over the knitted covering yarn (22) is wrapped, by a conventional spiral wrapping process, a pair of yarns (23) and (24) which may comprise a multifilament yarn having good flexibility and knitting characteristics, such as nylon or polyester. In claim 1 of the Robins patent, the invention is defined as a composite yarn adapted for use in cut resistant body protection apparel, comprising: a) a non-elastic core yarn and b) an abrasion and cut resistant non-elastic monofilament covering

Appeal No. 1997-0144
Application No. 08/424,223

yarn knitted onto and encasing the core yarn in a series of cut resistant loops. In claim 8, which depends from claim 1, the core yarn is further defined as comprising "a multifilament yarn selected from the group consisting of SPECTRA polyethylene, VECTRAN liquid crystal polymer, KEVLAR aramide fiber, olefin, nylon or polyester."

In rejecting the claims before us on appeal, the examiner has urged (answer, page 4) that it would have been obvious to one of ordinary skill in the art

to exchange the Kevlar in both the core and the first layer in Bettcher '251 for VECTRAN liquid crystal polymer fiber in view of Robins et al '781 so that the yarn produced will have a greater cut or abrasion resistance as well as other property improvements such as flexibility and suppleness thereby providing a higher quality glove therefrom. Note that the liquid crystal polymer disclosed in Robins et al '781 would inherently possess the property of a tenacity which is no more than 10 grams per denier. If however, the liquid crystal such as VECTRAN does not inherently possess the property of having a tenacity of no greater than 10 grams per denier, it would have been obvious to utilize the type of VECTRAN M fiber which does have this property as a matter of engineering choice of materials having known properties depending upon the cost and properties desired in the final product produced from the yarn since VECTRAN M is less expensive than VECTRAN HS.

Appeal No. 1997-0144
Application No. 08/424,223

On page 7 of the answer, the examiner urges that Robins teaches the interchangeability of VECTRAN liquid crystal fiber for KEVLAR fibers in cut-resistant yarns and that it would, accordingly, have been obvious to one of ordinary skill in the art to exchange the KEVLAR in both the core and first layer in Bettcher for VECTRAN liquid crystal polymer fibers in view of Robins. In addressing the limitation in the claims on appeal regarding the recited liquid crystal polymer fiber being one "having a tenacity of no more than 10 grams per denier," the examiner urges (answer, page 8) that Robins "teaches the use of both high and low tenacity fibers in the cut-resistant yarn and this teaching would be used to replace the KEVLAR in Bettcher."

Like appellant (brief, pages 6-11), absent knowledge of appellant's invention, we see nothing in Bettcher and Robins which would have suggested their combination in the manner urged by the examiner. In our opinion, the examiner has used impermissible hindsight derived from appellant's own teachings to reconstruct the knittable yarn of Bettcher so as to result in a structure which is responsive to that set forth in the claims before us on appeal. Given the strong emphasis in Bettcher that the synthetic fiber (20) of the core and the first wrapping (12)

Appeal No. 1997-0144
Application No. 08/424,223

of the composite yarn therein be a high strength relatively nonstretchable synthetic fiber, i.e., one having a tensile strength of about 400,000 lbs./sq. in. and higher (col. 3, lines 3-7 and col. 4, lines 20-24), we see no reasonable basis upon which to conclude that it would have been obvious to one of ordinary skill in the art to replace the high strength Kevlar core fiber (20) and high strength Kevlar first wrapping (12) of the yarn in Bettcher with a liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier, as has been urged by the examiner.

The mere fact that Robins with its knitted stainless steel covering yarn (12) may be willing to place a normal strength yarn, such as nylon, as the core (11) of a composite knittable fiber for making cut-resistant apparel, provides no teaching or suggestion for making that same modification in Bettcher by replacing the core fiber (20) and first wrapping (12) therein, which Bettcher teaches must have a tensile strength of not less than 400,000 lbs./sq. in., with a fiber having a tenacity of no more than 10g/denier. Thus, even if Robins can be said to have been suggestive of using a liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier (e.g., VECTRAN M) in

Appeal No. 1997-0144
Application No. 08/424,223

the core of its composite yarn, a point in some considerable doubt, we see nothing in the applied references or otherwise which would have led one of ordinary skill in the art to make any such substitution for the high strength Kevlar fibers in Bettcher.

Since we have determined that the teachings and suggestions found in Bettcher and Robins would not have made the subject matter as a whole of claims 1 through 3, 5, 6, 11, 12, 15 through 18, 25, 26, 35 and 36 on appeal obvious to one of ordinary skill in the art at the time of appellant's invention, we must refuse to sustain the examiner's rejection of those claims under 35 U.S.C. § 103.

Under the authority provided us by 37 CFR § 1.196(b), we enter the following new ground of rejection.

Claims 1, 11/1, 12/11/1, 15/1, 16/11/1, 35/1 and 36/35/1 are rejected under 35 U.S.C. § 103 as being unpatentable over Bettcher in view of the admittedly known normal strength fiber or yarn VECTRAN M described in appellant's specification at pages 2-4. Bettcher discloses a cut-resistant yarn (Fig. 1) having the

construction broadly set forth in claim 1 on appeal, with the exception that this patent does not disclose or teach that "at least one of" the core, first wrapping and second wrapping of the composite yarn therein be comprised of a liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier. However, Bettcher does teach that the yarn therein has a second wrapping or winding (14) which is preferably one having low friction, light weight, a silk-like hand, that is fast drying, resistant to light and low in cost, preferably, for example, nylon or a polyester (e.g., Dacron), both of which are recognized as normal strength fibers. Similarly, appellant's specification (pages 2-4) and brief (pages 13-14)¹ indicate that VECTRAN M sold by Hoechst Celanese Corp. is a normal strength fiber having good abrasion resistance, high impermeability, excellent property retention over a broad temperature range, low moisture absorption, can be laundered at high temperatures conventionally used for industrial fabrics, etc.. Given the nature of the known VECTRAN M fiber vis-a-vis the other normal strength fibers (e.g., nylon and polyester) for use in the second wrapping (14) of

¹ While appellant indicates on page 13 of the brief that a brochure on VECTRAN liquid crystal polymer fibers was submitted to the examiner, we find no such brochure of record in the application file.

Appeal No. 1997-0144
Application No. 08/424,223

Bettcher, it is our opinion that it would have been obvious to one of ordinary skill in the art at the time of appellant's invention to use the normal strength synthetic fiber VECTRAN M as one of the fibers for the second wrapping (14) of Bettcher so as to gain the self-evident benefits thereof relative to the underlying high strength Kevlar fiber wrapping (12) over which it would be applied. As for the claims requiring a metal strand in the cut-resistant yarn, we note the disclosure of Bettcher at column 1, lines 46-58, and column 2, lines 51-55. Bettcher also discloses (e.g., Fig. 2 and col. 4, line 48+) that the composite yarn therein may be formed into protective apparel, such as a cut-resistant protective glove.

In addition to the foregoing, we REMAND this application to the examiner to consider whether other rejections of the claims of this application would be appropriate, for example, other prior art rejections on art of record or otherwise, or a rejection based on 35 U.S.C. § 112, first paragraph, that the scope of enablement provided to one skilled in the art by the disclosure is not commensurate with the scope of protection sought by the claims, see particularly, MPEP § 2164.08. While the disclosure indicates that VECTRAN M has a tenacity in the

Appeal No. 1997-0144
Application No. 08/424,223

claimed range and a high cut resistance, we see nothing in the disclosure that would convey to one skilled in the art that all liquid crystal polymer fibers having a tenacity of no more than 10 grams per denier, as set forth in the claims on appeal, would have such characteristics and function in a similar manner.

This decision contains a new ground of rejection pursuant to 37 CFR § 1.196(b). 37 CFR § 1.196(b) provides that "a new ground of rejection shall not be considered final for purposes of judicial review."

37 CFR § 1.196(b) also provides that the appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (37 CFR § 1.197(c)) as to the rejected claims:

(1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .

(2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .



REVERSED; 1.196(b) and REMANDED

IAN A. CALVERT
Administrative Patent Judge

CHARLES E. FRANKFORT
Administrative Patent Judge

JENNIFER D. BAHR
Administrative Patent Judge

BOARD OF PATENT
APPEALS AND
INTERFERENCES

14

Appeal No. 1997-0144
Application No. 08/424,223

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Appeal No. 1997-0144
Application No. 08/424,223

CLAIM 1

A cut-resistant yarn suitable for machine knitting, comprising a core, a first wrapping about the core and a second wrapping about the first, at least one of said core, first wrapping and second wrapping being comprised of liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier.

CLAIM 17

A cut-resistant yarn suitable for machine knitting having a core comprised of liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier; a flexible metal strand; a wrapping of liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier, and one or more additional wrappings of synthetic fiber none of which has a tenacity greater than 10 grams per denier.

Claim 25

A cut-resistant yarn suitable for machine knitting having a core comprised of a liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier and a strand of wire, and having wrappings comprised of a wrapping of liquid crystal polymer fiber having a tenacity of no more than 10 grams per denier, and two wrappings each of which is either nylon or polyester over the liquid crystal polymer wrapping.